

*Marcy*

## KANGAROO TENDONS.

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[At the annual meeting of the Association of Obstetricians and Gynecologists, held in New York in September, in the discussion upon suture material, Dr. Henry O. Marcy, of Boston, advocated the use of kangaroo tendons, and the interest in the subject is so general, that we reprint the following from the volume of Transactions now in press.]

I take pleasure in exhibiting, at the request of some of the Fellows, samples of kangaroo tendons, in the condition in which they are sent to me from Australia. It will be noted that this animal has the tendon of the tail disposed in a bundle of parallel fibres, running its entire length. These vary in size, dependent upon the size and species of the animal. As will be observed, they are easily separated into even, smooth, round strands of uniform size. Those from the species called the wallabee are preferable, since the size of the tendons is that more commonly desired for the suturing of wounds. They vary somewhat in length, averaging about 20 inches. I have carefully studied the tendons of every animal which I thought could furnish the material suitable for sutures.

The Indian of the Northwest still uses as thread for domestic purposes the fascia lata of the moose, which is sun dried and maintained dry until wanted for immediate use. It is not unlike the fascia lata of the buffalo, which from time immemorial, until quite recently, has furnished an ample supply. It is almost identical with that of the reindeer of Northern Europe, which is still largely in use there as a suture. Tendons of this character have furnished me, in part, suture material for surgical purposes for the last ten years. They are, however, very inferior to kangaroo tendon sutures. The only other animals which I know that have tendons similarly disposed are the common rat, the squirrel and the opossum.



Dr. C. E. Mastin, of Mobile, sent me recently specimens from the tail of the opossum which furnish excellent suture material, but they are, unfortunately, only 10 or 12 inches in length.

I sent to Australia more than ten years ago for a supply of tendons from the tail of the kangaroo, inferring from the relationship of the species with the squirrel and opossum, that the tail of this animal should furnish similar tendons, and of course much longer and larger. It has been only after many and repeated efforts that I have been enabled, within two or three years, to secure a supply much in excess of my own immediate requirements. In earlier years I have paid any price demanded, even in Australia, 60 cents per strand, by the hundred. However, an arrangement has been recently effected, by which an ample supply may be obtained for furnishing the entire profession with reliable tendons. They are prepared ready for use, under my own personal supervision, at a cost of \$10 per hundred. These are kept by Messrs. Codman & Shurtleff, the well-known instrument makers of Boston, from whom they can be obtained, or, if preferred, by sending directly to me.

At this price the cost is not much in excess of well selected and properly prepared catgut, to which it is in every way greatly superior.

The tendons are taken from freshly killed animals, are quickly sun-dried, and kept dry until ready for preparation. They are then soaked soft in a sublimate solution (1-1,000), carefully separated, sorted, and quickly dried. They are then immersed in ether for twenty-four hours, although this seems hardly necessary, as they seem to be absolutely free of fat. After this they are chromicized and permanently put up in a solution of carbolic acid (1-10), after the Lister formula for the preparation of catgut. They should be retained in the carbolic oil until required for use, then wrapped in a towel, wrung from a 1-1,000 mercuric solution, for a few minutes, which makes them supple and easy of application. They do not soften and swell as cat-



gut similarly treated. It must, however, be remembered that every precaution of modern surgery is demanded in placing *aseptic* buried sutures *aseptically* in *aseptic* wounds.

I have experimented in the preparation of suture material, in the various ways advocated by a number of authors. I have found none so trustworthy as the chromicized suture, permanently kept in carbolic oil. I quite prefer not to use it until after it has been prepared for six months and it appears to improve with age. In the larger sizes, in well sterilized tissues, it can be demonstrated after three or four weeks, and a marked thickening of the tissues is observed along the line of the buried sutures for a considerable period longer.

Catgut has many defects, chief of which is that, for days together, the intestines of the animals, from which it is made, must remain in a state of active putrefaction, in order to separate the connective tissue sheath from the other coats of the bowel. This is then subdivided as required in size, and twisted into a thread, the ordinary catgut, or violin strings of commerce.

The sterilization of this material, so as to render it safe for sutures and ligatures, and yet not injure its integrity, is by no means easy. As has been shown by many observers, the larger sizes especially of catgut, prepared for surgical use, contain bacteria capable, under favorable circumstances, of reproduction. This is doubtless the most valid reason why catgut, as suture material, has fallen into disuse.

When its histological elements are investigated, it will be seen that its ultimate fibres cross each other diagonally to the long axis of the bowel. This is an admirable disposition to allow of the ever-varying size of the intestine, but it is little suitable for the purposes of great strength and inelasticity. The illustration is not overdrawn in the comparison of the attempt to make a strong cord by cutting the finest woven fabric upon the diagonal and twisting it. So great is the strength of the connective tissue of animals

that catgut, when kept dry, is capable of resisting great strain, as in the high tension of musical instrument strings. But, when macerated, a softening process which must take place in the tissues of the body, the catgut unfolds and becomes a soft, elastic material. This explains why, in the interrupted suture, the knot is so untrustworthy. The tendons proper of animals have their fibres uniformly disposed in parallel lines, and as a consequent, when moist, are many times stronger than the same size of catgut.

Under the most favorable circumstances, sterilized silk sutures disappear far too slowly; and for this reason, if used in any quantity, must generally be applied in a manner to permit of removal. When buried within the tissues, they are more generally encapsuled, rather than absorbed, and often, even after many months, produce irritation and are thrown off as a foreign body.

A properly prepared, aseptic animal suture, buried aseptically in healthy tissues, slowly disappears, and, as histological studies abundantly prove, they are replaced, in large measure, by connective tissue cells, making a band of living, constricting, or supporting structure, which surrounds the included part.

This is of the highest importance in the ligating of large vessels, and of almost equal value in the supporting of many of the structures coapted in wounds, as, for example, in hernia, the repair of the perineum, etc.

I am certain that one of the greatest advances in modern surgery is found in the immediate coaptation of all well vitalized aseptic wounds, hermetically sealed without drainage. For this purpose, the tendon suture is the ideal material, and I hazard very little in predicting that, at an early date, the clumsy, bungling method of closing wounds with interrupted sutures, at best liable to infection and subsequent danger, will be relegated to history, and the tendon suture will become an indispensable factor in wound treatment.